

## 2.10 Target Years for Pipeline

The pipe diameters of the transmission line and main distribution line are enlarged to meet the water demand in the target year. The diameter of the various case and target year calculated and shown in this tables and figures.

### 1) Transmission Pipeline

The table A was estimated the following conditions.

- (a) Pipelines shown in the table are adopted that wells connected this pipelines have enough capacity to cover the future water demand or additional wells are planned to be connected to this pipelines.
- (b) Pipe diameter is determined according to the pump operation hour and the water demand of each target year.
- (c) Pipe diameter is also selected to consider the minimum velocity and the future water demand.
- (d) Life times are 50 years in pipeline and 15 years in pump.
- (e) The sum per year consists of the pipeline construction cost, pump installation cost and these operation and maintenance cost.

#### - Debarwa

The case of pipe diameter of 100mm and 24hr pump operation of the target year 2005 is not cheapest in the target year 2005, but it is the same diameter of the target year 2010 and is economical in the target year 2010. This case must be planned a new pipe at the target year 2015 because the pipe diameter of 100mm can not be enough to cover the water demand of the target year 2015.

#### - Adiquala

The case of All Ex. & Intake that is pipe diameter of 100mm and 24hr pump operation of the target year 2005 is economical in the target year 2005, and it is the same diameter of the target year 2010 and 2015. The reason is that this case is not necessary of the booster pump.

The case of nADQ-1 that is pipe diameter of 125mm and 24hr pump operation in the target year 2010 is the same mentioned above.

#### - Dekemhare

Case- II of the target year 2005 is economical in the target year 2005, and it is the same diameter of the target year 2010 and 2015. The difference is only the booster pumps.

#### - Segeneiti

The case of pipe diameter of 100mm and 24hr pump operation of the target year 2005 is economical in the target year 2005, and it is the same diameter of the target year 2010 and 2015. The difference is only the booster pumps.

- Adi Keyih

The case of ADI-2 that is pipe diameter of 100mm of the target year 2005 is can be used the water demand of the target year 2010 and 2015.

Case II of DW-2 and BH-7 of the target year 2005 is not economical in the target year 2005, but it is the same diameter of the target year 2010 and 2015.

As mentioned above, the diameters of the transmission pipeline planned for the water demand of the target year 2010 are economical to use the water demand of the target year 2005 totally.

2) Main Distribution Pipeline

The table B was estimated the following conditions.

(f) Pipe diameter is determined according to the water demand of each target year.

(g) Pipe length is restricted within the are of the target year of 2005.

This table shows that the pipe diameters are enlarged according to the water demand, and its cost is also increased 22.2% in 2010 and 43.5% in 2015 against the target year 2005 on the average.

Therefore, the diameters of the transmission pipeline and main distribution pipeline are planned for the water demand in the target year 2010 under the project. The transmission pipeline and main distribution pipeline in the target year 2015 will be equipped with another one line to meet the water demand in the target year 2015. The reasons to employ these diameters are a) it is difficult to expand the facilities to meet the water demand, b) the facilities covering the water demand in the target year 2010 is nearly 20 % increase from those in 2005, and is cheaper than construction of another one line (refer to Appendix D), c) the facilities covering water demand in the final target year 2015 are nearly 40 % increase from those in 2005, and the final future plan is still unclear at present.

Transmission Pipeline

Table A

Name of Town	Well No.	Pipelines							Total Length (m)	Cost (Nkf)	Cost/Year (Nkf)	Pumps			Total Cost			
		Diameter	60	80	100	125	150	200				Well Pump Cost (Nkf)	Well Pump (Kw)	Booster Pump Cost (Nkf)	Booster Pump (Kw)	Cost/Year (Nkf)	O&M cost (Nkf)	(%)
Debarwa	2005 DEB-1		442.41	521.87	583.63	645.92	661.27	806.43	690	360,090	7,202	148,693	7.5		39,420	56,535	100.0	
	2005 DEB-1	24 ope.	0	690	0	0	0	0	690	402,705	8,054	148,693	7.5		39,420	57,387	101.5	
	2005 DEB-1	18 ope.	0	690	0	690	0	0	690	402,705	8,054	148,693	7.5		39,420	57,465	101.6	
	2010 DEB-1	Single Addition	0	690	0	690	0	0	690	402,705	8,054	151,193	11.0		57,816	75,950	134.3	
	2010 DEB-1	Double Addition	0	1,380	0	0	0	0	1,380	720,181	14,404	285,364	15.0		78,840	112,268	198.6	
	2015 DEB-1	Double Addition	0	1,380	0	0	690	0	1,380	720,181	14,404	289,257	15.0		78,840	112,527	199.0	
Adiqula	2005 All Ex.								2,851	1,487,851	29,757	149,864	7.5	82,104	111.0	15,465	142,458	100.0
	2010 All Ex.								2,851	1,663,929	33,279	172,851	11.0		57,816	102,618	72.0	
	2015 All Ex.								2,851	1,663,929	33,279	172,851	11.0	108,380	115,632	166,215	116.7	
Dekemhare	2005 BH-14, DEK-1, DEK-2	Case-1	628	948				3,941	7,767	4,940,401	98,808	397,811	17.2		187,639	324,787	100.0	
	2010 BH-14, DEK-1, DEK-2	Case-2	628	948				6,181	7,767	5,873,624	117,472	360,297	11.4		136,758	289,218	89.0	
	2015 BH-14, DEK-1, DEK-2		628	948				0	7,767	5,873,624	117,472	390,135	15.2		237,571	395,561	121.8	
	2005 SEG-2		5,253	1,085	4,168				5,253	2,741,383	54,828	159,909	7.5		177,138	203,441	100.0	
	2010 SEG-2		1,085	4,168					5,253	2,998,799	59,976	159,909	7.5		91,142	173,949	85.5	
	2015 SEG-2		1,085	4,168					5,253	2,998,799	59,976	167,297	11.0		186,651	257,020	126.3	
Adi Keyih	2005 ADI-2								2,853	1,665,096	33,302	172,851	11.0		103,883	186,407	100.2	
	2010 ADI-2								2,853	1,665,096	33,302	172,851	11.0		103,883	186,407	100.2	
	2015 ADI-2								2,853	1,665,096	33,302	172,851	11.0		103,883	186,407	100.2	
2005 DW-2, BH-7	Case-1	2,105	928						3,033	1,415,568	28,311	211,795	5.2		82,104	104,144	100.0	
	Case-2	343	1,772	918					3,033	1,612,273	32,245	211,795	5.2		85,997	108,075	103.8	
	2010 DW-2, BH-7		343	1,772	918				3,033	1,612,273	32,245	211,795	5.2		85,997	137,245	131.8	
2015 DW-2, BH-7		343	1,772	918					3,033	1,612,273	32,245	211,795	5.2		85,997	137,245	131.8	
		343	1,772	918					3,033	1,612,273	32,245	211,795	5.2		85,997	137,245	131.8	

Table B

## Distribution Pipeline

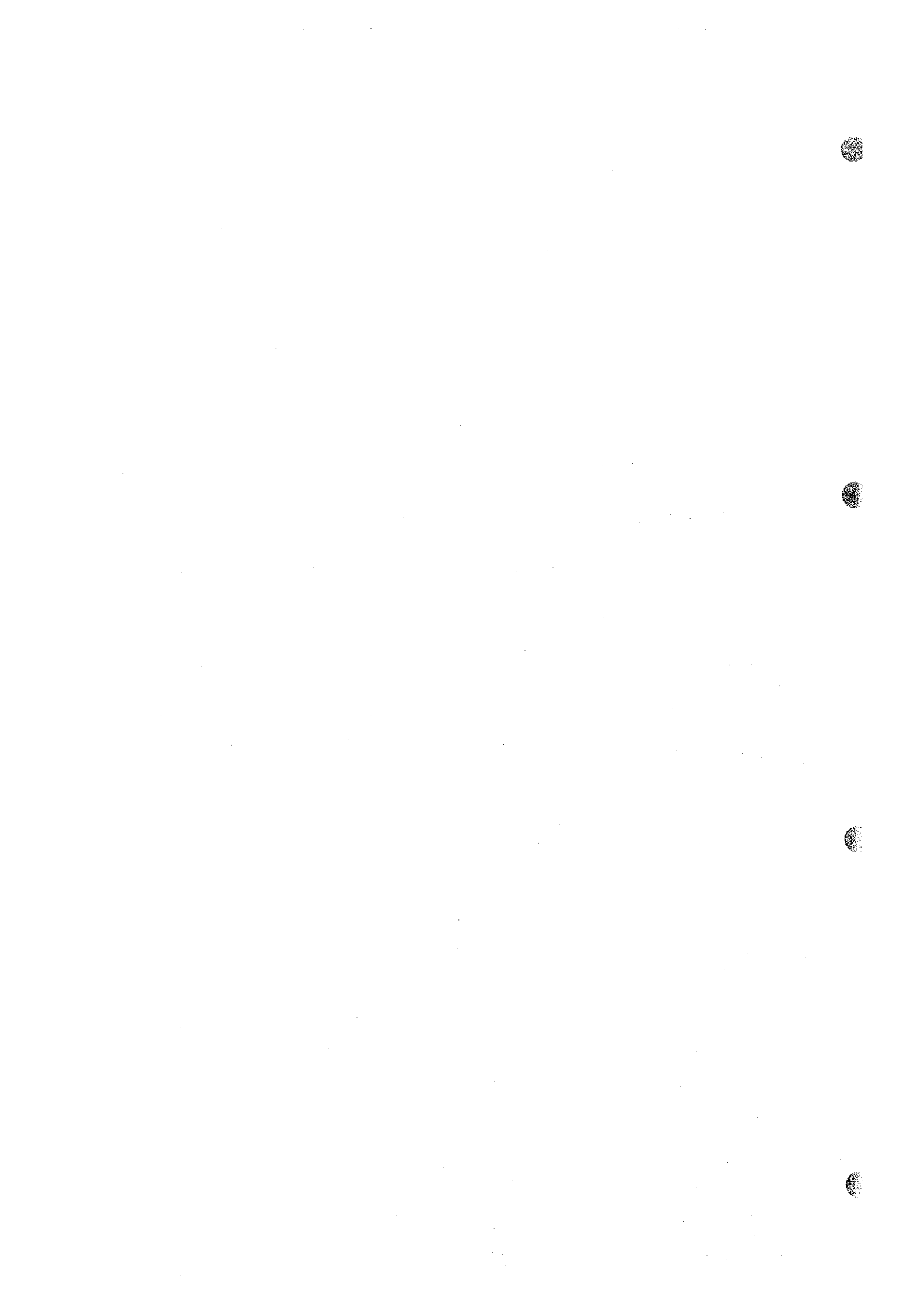
Pipe Diameter	(mm)	50	75	100	125	150	200	250	300	Total		
Unit Price	(Nkf)	133.75	183.28	229.77	274.61	365.34	625.80	926.50	1,119.32	(Nkf)	(%)	
<b>Debarwa</b>												
2005	Length	(m)	3,531	983	365						4,879	
	Cost	(Nkf)	472,271	180,164	83,866	0	0	0	0	0	736,302	100.0
2010	Length	(m)	3,001	1,513		365					4,879	
	Cost	(Nkf)	401,384	277,303	0	100,233	0	0	0	0	778,919	105.8
2015	Length	(m)	1,696	1,258	582	978	365				4,879	
	Cost	(Nkf)	226,840	230,566	133,726	268,569	133,349	0	0	0	993,050	134.9
<b>Mendefera</b>												
2005	Length	(m)	1,510	2,417	510	419	883				5,739	
	Cost	(Nkf)	201,963	442,988	117,183	115,062	322,595	0	0	0	1,199,790	100.0
2010	Length	(m)	389	1,114	454	1,970	832	980			5,739	
	Cost	(Nkf)	52,029	204,174	104,316	540,982	303,963	613,284	0	0	1,818,747	151.6
2015	Length	(m)	291	1,212	172	2,252	832	97	883		5,739	
	Cost	(Nkf)	38,921	222,135	39,520	618,422	303,963	60,703	818,100	0	2,101,764	175.2
<b>Adiguala</b>												
2005	Length	(m)	1,194	1,326	212	15					2,747	
	Cost	(Nkf)	159,698	243,029	48,711	4,119	0	0	0	0	455,557	100.0
2010	Length	(m)	1,194	1,326	212	15					2,747	
	Cost	(Nkf)	159,698	243,029	48,711	4,119	0	0	0	0	455,557	100.0
2015	Length	(m)	1,194	1,326	212	0	15				2,747	
	Cost	(Nkf)	159,698	243,029	48,711	0	5,480	0	0	0	456,918	100.3
<b>Dekemhare</b>												
2005	Length	(m)	1,485	2,901	2,133	630	205	133			7,487	
	Cost	(Nkf)	198,619	531,695	490,099	173,004	74,895	83,231	0	0	1,551,544	100.0
2010	Length	(m)	849	1,275	2,599	1,486	940	205	133		7,487	
	Cost	(Nkf)	113,554	233,682	597,172	408,070	343,420	128,289	123,225	0	1,947,412	125.5
2015	Length	(m)	647	1,191	1,447	774	1,884	1,206	134	204	7,487	
	Cost	(Nkf)	86,536	218,286	332,477	212,548	688,301	754,715	124,151	228,341	2,645,356	170.5
<b>Segeneiti</b>												
2005	Length	(m)	2,008	1,186		531					3,725	
	Cost	(Nkf)	268,570	217,370	0	145,818	0	0	0	0	631,758	100.0
2010	Length	(m)	2,008	954	232	531					3,725	
	Cost	(Nkf)	268,570	174,849	53,307	145,818	0	0	0	0	642,544	101.7
2015	Length	(m)	2,008	954	232	531					3,725	
	Cost	(Nkf)	268,570	174,849	53,307	145,818	0	0	0	0	642,544	101.7
<b>Adi Keyih</b>												
2005	Length	(m)		1,134	983	584	859				3,560	
	Cost	(Nkf)	0	207,840	225,864	160,372	313,827	0	0	0	907,903	100.0
2010	Length	(m)	0	776	844	1,081	216	643			3,560	
	Cost	(Nkf)	0	142,225	193,926	296,853	78,913	402,389	0	0	1,114,307	122.7
2015	Length	(m)	0	776	486	1,439	216	643			3,560	
	Cost	(Nkf)	0	142,225	111,668	395,164	78,913	402,389	0	0	1,130,360	124.5
<b>Senafe</b>												
2005	Length	(m)	1,216	1,356	632	198	120				3,522	
	Cost	(Nkf)	162,640	248,528	145,215	54,373	43,841	0	0	0	654,596	100.0
2010	Length	(m)	906	774	1,270	254	318				3,522	
	Cost	(Nkf)	121,178	141,859	291,808	69,751	116,178	0	0	0	740,773	113.2
2015	Length	(m)	616	747	1,105	586	348	120			3,522	
	Cost	(Nkf)	82,390	136,910	253,896	160,921	127,138	75,096	0	0	836,352	127.8
Total Length		(m)	25,743	26,499	14,682	14,639	8,033	4,027	1,150	204	94,977	
Tatao Cost	2005	(Nkf)									6,137,449	100.0
	2010	(Nkf)									7,498,259	122.2
	2015	(Nkf)									8,806,343	143.5

**APPENDIX E**

**SANITATION**

## List of Tables

	<b>Page</b>
Table 4.1 Dekemhare Water Supply and Consumption Pattern.....	E-1
Table 4.2 Domestic Water Consumption and Source of Water Supply.....	E-3
Table 4.3 Toilet condition and Related Behaviors.....	E-4
Table 4.4 Conditions of Waste disposal.....	E-4
Table 4.5 Dekemhare Schools Present Water and Latrine Facilities Condition.....	E-5
Table 4.6 Cases of Water and Poor Sanitation Related Diseases in Dekemhare.....	E-6
Table 4.7 Conditions of Health.....	E-7
Table 4.8 Hand Washing Behavior.....	E-7
Table 4.9 Food Handling.....	E-8
Table 4.10 Households Perception of Health and Hygiene.....	E-8



**Table 4.1 Dekemhare Water Supply and Consumption Pattern**

	Domestic water consumption by private house water connection		Commercial water consumption by private connection		Gov't establishments water consumption by private water connection		Domestic water consumption by water tanker.	
	m <sup>3</sup>	No. of Customers	m <sup>3</sup>	No. of customers	m <sup>3</sup>	No. of Customers	m <sup>3</sup>	No. of Truck
Jan-Feb/95	4511	424	1671	82	395	27	2824	2
Mar.-Apr.	5252	427	1930	83	368	27	2244	2
May-Jun.	4945	423	1969	82	435	27	3319	2
July-Aug.	4266	420	2012	82	741	27	1184	2
Sep.-Oct.	3393	421	1115	82	330	27	5423	2
Nov.-Dec.	3150	429	1060	82	299	27	7318	2
<b>Total</b>	<b>30,452</b> <b>41%</b>		<b>11,399</b> <b>15%</b>		<b>2,867</b> <b>4%</b>		<b>29,285</b> <b>40%</b>	
Jan-Feb/96	4935	434	1642	82	299	26	6973	5
Mar.-Apr.	2859	435	1305	82	232	25	9729	5
May-Jun.	2920	437	1464	80	298	25	7629	5
July-Aug.	3123	436	1767	80	289	24	5738	5
Sep.-Oct.	4329	437	1973	80	416	24	10226	5
Nov.-Dec.	3733	431	1376	82	258	24	8805	5
<b>Total</b>	<b>16,961</b> <b>25%</b>		<b>7,885</b> <b>12%</b>		<b>1,502</b> <b>2%</b>		<b>42,118</b> <b>61%</b>	

Continue .....



**Table 4.1 Dekemhare Water Supply and Consumption Pattern**

	Domestic water consumption by private house water connection		Commercial water consumption by private connection		Gov't establishments water consumption by private water connection		Domestic water consumption by water tanker.	
	m <sup>3</sup>	No. of Customers	m <sup>3</sup>	No. of Customers	m <sup>3</sup>	No. of Customers	m <sup>3</sup>	No. of Truck
Jan-Feb/97	3309	437	1166	81	239	23	8824	5
Mar.-Apr.	6427	437	2291	82	482	23	9329	5
May-Jun.	4187	433	1553	83	249	22	8913	5
July-Aug.	791	432	232	84	39	22	6105	5
<b>Total</b>	<b>14,714</b> 32%		<b>5,242</b> 12%		<b>1,009</b> 2%		<b>25,071</b> 54%	

Source: WSS of Dekemhare

**Table 4.2. Domestic Water Consumption and Source of Water Supply**

Source of water supply	Household users, %	Ave. volume of water consumption		Ave. expenditure for Water Nfa/m <sup>3</sup>	Ave. income Nfa/mon
		m <sup>3</sup> /hld/mon	l/c/d		
Municipality supply		m <sup>3</sup> /hld/mon	l/c/d		
House connection	14.6	4	25.59	16.00	924
Yard connection	22.5	2.45	15.67	11.75	921.71
Communal Water point	-	-	-	-	-
Private well	0.7	-	-	-	1340
Public well	0	-	-	-	-
River/spring	0	-	-	-	-
Water tanker	78.1	2.58	16.51	25.8	942
Water vender	0	-	-	-	-
Rain water	90.7	1.29	8.25	-	939

*Source: Socio-economic survey conducted by JICA Study Team Nov. 1997*

**Table 4.3 Toilet Condition and Related Behaviors**

Type of latrines used	Septic tank/cesspool 46.4%	Dry pit 13.2%	Community toilet 0%		Open field 40.4%	
Condition of septic tank/cesspool and pit latrine	Clean squatting hole 67.8%	Clean slab 70%	Well fitting lid 24.4%	Good ventilation 62.2%	No flies 83.3%	Not filled up 92.2%
Households satisfied with the existing latrines used	61.3%		Average distance of latrine from the nearest water source			492m
Affordable preferences of unsatisfied households	Septic tank/cesspool 36.2%	Dry pit 32.8%	Community toilet 29.3%	Open field 1.7%		
Households favoring credit system for latrine construction	34.1%		Ave. of maximum repayment a household afford			27Nfa/mon
Type of anal cleansing material used	Stone 8.6%	Water 7.3%	Paper 95.4%	Twig 0%	Leaves 0%	Nothing 0%

**Table 4.4 Conditions of Waste disposal**

Solid waste disposal	Open field 4.6%	Open pit 9.3%	Covered in pit 0%	Burn 0.7%	Municipality truck 85.4%
Waste water disposal	Open field 82.1%	Pit 10.6%	Gardening 2%	Drainage system 5.3%	
Animal waste disposal	Used as fuel 37.5%	Used as fertilizer 25%	Thrown in a pit 12.5%	Open field 25%	
Infant excreta disposal	Open field 8%	Popo and thrown to the field 32%		Popo and put in the toilet 60%	

**Table 4.5 Dekemhare Schools Present Water and Latrine Facilities Condition**

Name of School	Water supply facility		Latrine facility	
	Availability	Remark	Availability	Remark
Awet elementary school.	Yes	Private supply by solar energy	Yes	
Dekemhare junior and Secondary sch.	No	Continuous supply from town	Yes	But not functional
Hadane elementary sch.	No	Never had	No	Never had and no space to provide
Kidus Yakob elementary sch. Non gov't.	No	Never had	No	Never had
Kidus Yakob kindergarten sch. Non gov't.	Yes	Private but does not have enough yield	No	Never had
Betiel elementary school. Non gov't.	Yes	Private well fitted with wind mill	Yes	Good condition
Faith Mission boarding school. Non gov't.	Yes	Private supply	Yes	Good condition
Felege Selam elementary sch.	No	Never had	No	Never had
Comboni kindergarten sch. Non gov't	Yes	Private by wind mill energy	Yes	In good condition
Municipality kindergarten school	No	Never had	No	Never had

**Table 4.6 Cases of Water and Poor Sanitation Related Diseases in Dekemhare**

Description of Disease	1995	1996	1997
<b>Water-borne &amp; washed diseases</b>			
Typhoid	23	17	24
Hepatitis	33	35	8
Diarrhoea, Amebic Dysentery, Giardiasis, Bacillary dysentery	2250	1976	1241
Scabies & Fungal infection	324	314	270
Trachoma	168	164	70
Asthma	426	711	502
Rickettsial Typhus			
<b>Water basis</b>			
Schistosomiasis	19	20	11
<b>Total</b>	<b>3,243</b> <b>21%</b>	<b>3,237</b> <b>21%</b>	<b>2,126</b> <b>14%</b>
<b>Water related insect vector</b>			
Malaria	<b>1,888</b> <b>12%</b>	<b>1,183</b> <b>8%</b>	<b>404</b> <b>3%</b>

*Source: Dekemhare health center*

**Table 4.7 Conditions of Health**

Water related disease cases in the last six months	Ave. number of cases	Ave. number of cases by type of diseases				
	1person/hld	Diarrhea 8 person 12.3 %	Dysentery 7 person 16.3 %	Malaria 11 person 22.4%	Warms 1 person 4.8 %	Scabies 6 person 42.9 %
Ave. medical cost	Diarrhea 15.13 Nfa/case	Dysentery 28.92 Nfa/case	Malaria 39.94 Nfa/case	Warm 7 Nfa/case	Scabies 25.20 Nfa/case	
Type of treatment	Self-administered traditional medicine 2%	Self- administered modern medicine 4%	Consult traditional healer 0%	Consult physician 93.4%		
Infants health condition	Households with infant 4.6%	Infants death in the last 10 years 1.17 persons	Child immunization 93.7%			

Source: Socio-economic survey conducted by JICA Study Team Nov. 1997

**Table 4.8 Hand Washing Behavior**

	Hand washing method					
	with water and soap	with water & ash	with water & mud	with water only	with other material	nothing
After defecation	57%	0%	0%	29.8%	0.7%	12.6%
Before cooking	30.5%	0%	0%	65.6%	0%	4%
Before eating	25.8%	0%	0%	72.2%	1.3%	0.7%
After disposal of children stool	62.9%	0%	0%	31.4%	0%	5.7%
After handling animal dung	75%	0%	0%	0%	0%	12.5%

Source: Socio-economic survey conducted by JICA Study Team Nov. 1997

**Table 4.9 Food Handling**

Placing utensil	on shelf 67.5%	on floor 10.6%	over the table 16.6%	Other 5.3%	
Storage of left over food	Covered 90%	Open to flies 0.7%	No leftover food 6.7%	Thrown away 0.7%	Other 2.0%
Washing raw food before eating	Washing vegetable 99.3%	Washing meat 50%	Washing fruit 78.8%		

*Source: Socio-economic survey conducted by JICA Study Team Nov. 1997*

**Table 4.10 Households Perception of Health and Hygiene**

ORS preparation knowledge 76.8%	Participation on health/hygiene education session 72.2%	Satisfaction on health/hygiene education session 96.6%		
Participation in community sanitation work 91.7%	Areas of involvement			
	Cash contribution 41.9%	Material contribution 0.7%	Labor contribution 56.8%	Not willing 0.7%

*Source: Socio-economic survey conducted by JICA Study Team Nov. 1997*

**APPENDIX F**  
**COST ESTIMATION**



## TABLE OF CONTENTS

	<b>Page</b>
<b>1. Water Supply.....</b>	<b>F-1</b>
Table 1.1 Bill of Quantity.....	F-1
Table 1.2 (1) Project Cost (2005).....	F-2
Table 1.2 (2) Project Cost (2010).....	F-3
Table 1.2 (3) Project Cost (2015).....	F-4
Table 1.3 O&M Cost.....	F-5
<b>2. Sanitation .....</b>	<b>F-6</b>
Table 2.1 Bill of Quantity for School and Public Latrine.....	F-6
Table 2.1 (1) Bill of Quantity for School and Public Latrine.....	F-7
Table 2.1 (2) Bill of Quantity for School and Public Latrine.....	F-8
Table 2.1 (3) Bill of Quantity for School and Public Latrine.....	F-9
Table 2.1 (4) Bill of Quantity for School and Public Latrine.....	F-10
Table 2.2 Bill of Quantity for Household Flush Latrine.....	F-11
Table 2.2 (1) Bill of Quantity for Household Flush Latrine .....	F-12
Table 2.2 (2) Bill of Quantity for Household Flush Latrine .....	F-13
Table 2.2 (3) Bill of Quantity for Household Flush Latrine .....	F-14
Table 2.2 (4) Bill of Quantity for Household Flush Latrine .....	F-15
Table 2.3 Bill of Quantity for Double PIT VIP Latrine.....	F-16
Table 2.4 Cost Estimation of Latrine.....	F-17
Table 2.5 Cost Estimation of Public Facility.....	F-17

# 1. Water Supply

Table 1.1 Bill of Quantity

Item		Unit	Year		
Facility	Description		2005	2010	2015
Intake Facility	New borehole	sets			2
	Existing borehole	sets	1	1	
	Observation borehole	sets	2		
	Dam	sets			
	(Sub-total)	sets	3	3	1
Well Pump Facility	Submersible pump		DEK-1, 0.198m <sup>3</sup> /min 28.1m, 1set	nDEK-2, 0.264m <sup>3</sup> /min 120.9m, 1set	DAM, 1.746m <sup>3</sup> /min 120.6m, 1set
			DEK-2, 0.336m <sup>3</sup> /min 39.5m, 1set	nDEK-1, 0.264m <sup>3</sup> /min 85.2m, 1set	
			BH-14, 0.384m <sup>3</sup> /min 56.1m, 1set	BH-19, 0.288m <sup>3</sup> /min 129.3m, 1set	
				DEK-2, 0.336m <sup>3</sup> /min 44.6m, 1set	
				BH-14, 0.384m <sup>3</sup> /min 61.1m, 1set	
(Sub-total)	sets	3	5	1	
Transmission Pipeline	DCIP 200mm	m	6,191.0		11,200.0
	ditto 150mm	m			
	ditto 125mm	m		2,100.0	
	ditto 100mm	m	948.0	3,500.0	
	ditto 80mm	m	628.0	2,500.0	
	ditto 60mm	m			
	(Sub-total)	m	7,767.0	8,100.0	11,200.0
Booster Pump Facility	Centrifugal pump		BP.1, 0.918m <sup>3</sup> /min 100.8m, 1set	BP.1, 1.446m <sup>3</sup> /min 111.1m, 1set	BP.2, 1.746m <sup>3</sup> /min 120.6m, 1set
			BP.1', 0.218m <sup>3</sup> /min 15.0m, 1set	BP.1', 0.287m <sup>3</sup> /min 15.0m, 1set	BP.1', 0.310m <sup>3</sup> /min 15.0m, 1set
	(Sub-total)	sets	2	2	2
Pump Pit	Made of RC		30m <sup>3</sup> , 1set	15m <sup>3</sup>	55m <sup>3</sup>
	(Sub-total)	sets	1	1	1
Reservoir	Made of RC		440m <sup>3</sup>	380m <sup>3</sup>	720m <sup>3</sup> 50m <sup>3</sup> , 2set 30m <sup>3</sup>
	Made of F R P		15m <sup>3</sup> , h=12m		
	Existing				
(Sub-total)	sets	2	1	4	
Distribution Pipeline	P V C 300mm	m			
	ditto 250mm	m	133.0		
	ditto 200mm	m	205.0		71.0
	ditto 150mm	m	940.0		2,336.0
	ditto 125mm	m	1,486.0	510.0	2,695.0
	ditto 100mm	m	2,599.0	566.0	3,489.0
	ditto 75mm	m	1,275.0	1,921.0	5,379.0
	ditto 50mm	m	37,136.0	13,696.0	33,922.0
	(Sub-total)	m	43,774.0	16,693.0	47,892.0
Control House	sets	5	3	2	
Communal Water Point	sets	20	9	22	
Individual Connection	sets	2,676	1,343	1,832	
Tempolaty Road	Width 3.0m	m	200		

Table 1.2 (1) Project Cost (2005)

(Nakfa)

Description		Unit	Quantity	Unit Cost		Cost		Total
Item	Dimension			Local C.	Foreign C.	Local C.	Foreign C.	
<b>1. Construction Cost</b>								
Intake facility	New well	set		13,229.04	273,277.16	0	0	
	Exsiting well	set	1	9,275.43	85,317.49	9,275	85,317	
	Observation well	set	2	0.00	0.00	0	0	
	Dam	set		623,348.93	128,680.50	0	0	
	(sub total)	set	3			9,275	85,317	94,593
Submersible pump	DEK-1, 0.198m <sup>3</sup> /min 28.1m	set	1	10,505.05	131,623.47	10,505	131,623	
	DEK-2, 0.336m <sup>3</sup> /min 39.5m	set	1	10,526.30	151,509.08	10,526	151,509	
	BH-14, 0.384m <sup>3</sup> /min 56.1m	set	1	10,604.45	171,632.30	10,604	171,632	
	(sub total)		3			31,636	454,765	486,401
Transmission pipeline	D C I P 200mm	m	6,191	245.85	842.83	1,522,048	5,217,972	
	150mm	m		221.01	671.71	0	0	
	125mm	m		214.20	657.79	0	0	
	100mm	m	948	207.31	580.60	196,526	550,408	
	80mm	m	628	204.69	499.83	128,543	313,895	
	60mm	m		203.85	393.40	0	0	
	(sub total)	m	7,767			1,847,118	6,082,274	7,929,392
Booster pump	BP.1, 0.918m <sup>3</sup> /min 100.8m	set	1	2,601.00	236,733.23	2,601	236,733	
	BP.1', 0.218m <sup>3</sup> /min 15.0m	set	1	1,839.48	81,251.33	1,839	81,251	
	(sub total)		2			4,440	317,985	322,425
Pump pit	RC 30m <sup>3</sup>	sets	1	93,731.93	70,057.89	93,732	70,058	
	(sub total)		1			93,732	70,058	163,790
Reservoir	RC 440m <sup>3</sup>	sets	1	668,410.26	259,744.46	668,410	259,744	
	F R P 15m <sup>3</sup> , h=12m	sets	1	50,716.91	628,355.05	50,717	628,355	
	(sub total)		2			719,127	888,100	1,607,227
Distribution pipeline	P V C 300mm	m		289.52	1,221.56	0	0	
	250mm	m	133	249.89	1,000.89	33,235	133,118	
	200mm	m	205	222.67	622.16	45,647	127,542	
	150mm	m	940	181.05	312.16	170,186	293,430	
	125mm	m	1,486	167.54	203.19	248,957	301,934	
	100mm	m	2,599	154.76	155.42	402,232	403,941	
	75mm	m	1,275	140.33	107.09	178,924	136,544	
	50mm	m	37,136	126.50	54.06	4,697,518	2,007,715	
	(sub total)	m	43,774			5,776,698	3,404,226	9,180,924
Control house	Type A	sets	2	137,822.18	9,992.65	275,644	19,985	
	Type B	sets	1	195,386.85	10,232.97	195,387	10,233	
	Type C	sets	1	196,861.35	10,530.98	196,861	10,531	
	Type D	sets	1	254,523.76	10,963.56	254,524	10,964	
	(sub total)	sets	5			922,416	51,713	974,129
Comunal water point		sets	20	18,019.46	6,866.40	360,389	137,328	497,717
Individual connection		set	2,676	0.00	0.00	0	0	0
Temporary Road	width3.0m	m	200	297.00	0.00	59,400	0	59,400
Sub-Total						9,824,232	11,491,765	21,315,997
2. Engineering Fee							2,131,600	2,131,600
3. Administration Cost						426,320		426,320
4. Physical Contingency						1,025,055	1,362,336	2,387,392
Total						11,275,607	14,985,701	26,261,309
5. Price Contingency						1,393,665	1,852,233	3,245,898
Grand Total						12,669,273	16,837,934	29,507,207

Table 1.2 (2) Project Cost (2010)

(Nakfa)

Description		Unit	Quantity	Unit Cost		Cost		Total
Item	Dimension			Local C.	Foreign C.	Local C.	Foreign C.	
<b>1. Construction Cost</b>								
Intake facility	New well	set	2	13,229.04	273,277.16	26,458	546,554	
	Exsiting well	set	1	9,275.43	85,317.49	9,275	85,317	
	Observation well	set		0.00	0.00	0	0	
	Dam	set		623,348.93	128,680.50	0	0	
	(sub total)	set	3			35,734	631,872	667,605
Submersible pump	nDEK-2, 0.264m <sup>3</sup> /min 120.9m	set	1	10,703.31	215,147.16	10,703	215,147	
	nDEK-1, 0.264m <sup>3</sup> /min 85.2m	set	1	10,603.85	181,995.60	10,604	181,996	
	BH-19, 0.288m <sup>3</sup> /min 129.3m	set	1	10,703.31	222,645.30	10,703	222,645	
	DEK-2, 0.336m <sup>3</sup> /min 44.6m	set	1	10,604.45	171,632.30	10,604	171,632	
	BH-14, 0.384m <sup>3</sup> /min 61.1m	set	1	10,625.16	191,691.43	10,625	191,691	
	(sub total)		5			53,240	983,112	1,036,352
Transmission pipeline	D C I P 200mm	m		245.85	842.83	0	0	
	150mm	m		221.01	671.71	0	0	
	125mm	m	2,100	214.20	657.79	449,829	1,381,364	
	100mm	m	3,500	207.31	580.60	725,571	2,032,096	
	80mm	m	2,500	204.69	499.83	511,718	1,249,580	
	60mm	m		203.85	393.40	0	0	
(sub total)	m	8,100			1,687,118	4,663,040	6,350,158	
Booster pump	BP.1, 1.446m <sup>3</sup> /min 111.1m	set	1	2,271.46	291,527.35	2,271	291,527	
	BP.1', 0.287m <sup>3</sup> /min 15.0m	set	1	1,839.48	79,456.90	1,839	79,457	
	(sub total)		2			4,111	370,984	375,095
Pump pit	RC 15m <sup>3</sup>	sets	1	62,765.43	38,970.28	62,765	38,970	
	(sub total)		1			62,765	38,970	101,736
Reservoir	RC 380m <sup>3</sup>	sets	1	628,331.70	251,163.74	628,332	251,164	
	FR P	sets						
(sub total)		1			628,332	251,164	879,495	
Distribution pipeline	P V C 300mm	m		289.52	1,221.56	0	0	
	250mm	m		249.89	1,000.89	0	0	
	200mm	m	0	222.67	622.16	0	0	
	150mm	m	0	181.05	312.16	0	0	
	125mm	m	510	167.54	203.19	85,443	103,625	
	100mm	m	566	154.76	155.42	87,596	87,969	
	75mm	m	1,921	140.33	107.09	173,039	191,594	
	50mm	m	13,696	126.50	54.06	1,732,476	740,458	
(sub total)	m	16,693			2,078,554	1,123,646	3,202,200	
Control house	Type A	sets	2	137,822.18	9,992.65	275,644	19,985	
	Type B	sets	1	195,386.85	10,232.97	195,387	10,233	
	Type C	sets		196,861.35	10,530.98	0	0	
	Type D	sets		254,523.76	10,963.56	0	0	
	(sub total)	sets	3			471,031	30,218	501,249
Comunal water point		sets	9	18,019.46	6,866.40	162,175	61,798	223,973
Individual connection		set	1,343	0.00	0.00	0	0	0
Temporary Road	width3.0m	m	0	297.00	0.00	0	0	0
Sub-Total						5,183,060	8,154,803	13,337,864
<b>2. Engineering Fee</b>							1,333,786	1,333,786
<b>3. Administration Cost</b>						266,757		266,757
<b>4. Physical Contingency</b>						544,982	948,859	1,493,841
<b>Total</b>						5,994,799	10,437,449	16,432,248
<b>5. Price Contingency</b>						2,508,938	4,368,272	6,877,210
<b>Grand Total</b>						8,503,737	14,805,721	23,309,458

Table 1.2 (3) Project Cost (2015)

(Nakfa)

Description		Unit	Quantity	Unit Cost		Cost		Total	
Item	Dimension			Local C.	Foreign C.	Local C.	Foreign C.		
<b>1. Construction Cost</b>									
Intake facility	New well	set		13,229.04	273,277.16	0	0		
	Exsiting well	set		9,275.43	85,317.49	0	0		
	Observation well	set		0.00	0.00	0	0		
	Underground Dam	set	1	623,348.93	128,680.50	623,349	128,680		
	(sub total)	set	1			623,349	128,680	752,029	
Submersible pump	DAM, 1.746m <sup>3</sup> /min 120.6m	set	1	11,520.81	530,186.17	11,521	530,186		
	(sub total)		1			11,521	530,186	541,707	
Transmission pipeline	D C T P 200mm	m	11,200	245.85	842.83	2,753,503	9,439,717		
	150mm	m		221.01	671.71	0	0		
	125mm	m		214.20	657.79	0	0		
	100mm	m		207.31	580.60	0	0		
	80mm	m		204.69	499.83	0	0		
	60mm	m		203.85	393.40	0	0		
	(sub total)	m	11,200			2,753,503	9,439,717	12,193,221	
Booster pump	BP.2, 1.746m <sup>3</sup> /min 120,6m	set	1	3,360.87	564,023.94	3,361	564,024		
	BP.1', 0.310m <sup>3</sup> /min 15.0m	set	1	1,860.75	88,482.61	1,861	88,483		
	(sub total)		2			5,222	652,507	657,728	
Pump pit	RC 55m <sup>3</sup>	sets	1	136,057.50	99,898.12	136,057	99,898		
	(sub total)					136,057	99,898	235,956	
Reservoir	RC 720m <sup>3</sup>	sets	1	933,965.19	314,371.95	933,965	314,372		
	50m <sup>3</sup>		2	195,893.96	153,789.73	391,788	307,579		
	30m <sup>3</sup>		1	170,139.19	147,359.88	170,139	147,360		
	FRP	sets							
(sub total)		4			1,495,892	769,311	2,265,204		
Distribution pipeline	PVC 300mm	m		289.52	1,221.56	0	0		
	250mm	m		249.89	1,000.89	0	0		
	200mm	m	71	222.67	622.16	15,809	44,173		
	150mm	m	2,336	181.05	312.16	422,929	729,206		
	125mm	m	2,695	167.54	203.19	451,507	547,586		
	100mm	m	3,489	154.76	155.42	539,972	542,267		
	75mm	m	5,379	140.33	107.09	754,849	576,056		
	50mm	m	33,922	126.50	54.06	4,290,963	1,833,954		
(sub total)	m	47,892			6,476,029	4,273,241	10,749,271		
Control house	Type A	sets	1	137,822.18	9,992.65	137,822	9,993		
	Type B	sets		195,386.85	10,232.97	0	0		
	Type C	sets	1	196,861.35	10,530.98	196,861	10,531		
	Type D	sets	0	254,523.76	10,963.56	0	0		
	(sub total)	sets	2			334,684	20,524	355,207	
Comunal water point		sets	22	18,019.46	6,866.40	396,428	151,061	547,489	
Individual connection		set	1,832	0.00	0.00	0	0	0	
Temporary Road	width3.0m	m		297.00	0.00	0	0	0	
Sub-Total						12,232,685	16,065,126	28,297,811	
2. Engineering Fee							2,829,781	2,829,781	
3. Administration Cost							565,956	565,956	
4. Physical Contingency							1,279,864	1,889,491	3,169,355
Total						14,078,506	20,784,398	34,862,903	
5. Price Contingency							12,646,701	18,670,595	31,317,296
Grand Total						26,725,207	39,454,992	66,180,199	

**Table 1.3 O&M Cost****(Nakfa)**

Description	2005	2010	2015
1. Personnel cost	393,287	683,890	1,044,504
2. Electricity & fuel cost	315,675	450,334	1,275,947
3. Chemical cost	22,369	41,553	84,088
4. Repairing cost	121,687	202,808	365,043
5. Miscellaneous cost	85,302	137,858	276,958
Total	938,320	1,516,443	3,046,539

## 2. Sanitation

Table 2.1 Bill of Quantity for School and Public Latrine

### SUMMARY

#### A. SUPERSTRUCTURE

1 EXCAVATION AND EARTHWORK	6905,00
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#### B. SUPERSTRUCTURE

1 BRICKWORKS	7060,00
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2 CARPENTARY AND JOINERY	6140,00
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3 METAL WORKS	5200,00
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4 PLASTERING	2038,00
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5 PAINTING	1660,00
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6 SANITARY INSTALLATION	14998,00
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7 SEPTIC TANK	30724,56
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<b>TOTAL</b>	<b>74 725,56</b>
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Table 2.1 (1) Bill of Quantity for School and Public Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
<b><u>A. SUBSTRUCTURE</u></b>					
<b><u>1. EXCAVATION &amp; EARTHWORKS</u></b>					
1.1	Clear off site to remove top soil to an average depth of 20cm.	m2	50	4	200
1.2	Excavate for trench foundation in ordinary soil to a depth not exceeding 75cm from the stripped ground level.	m3	39	25	975
1.3	Return fill around foundation with good, dry excavated material from site and well ram in layers every 25cm interval.	m3	26	22	572
1.4	Cartaway surplus excavated material to a distance not exceeding 5km from the compound.	m3	13	25	325
1.5	25cm thick basaltic or equivalent stone hardcore and blinded with crushed stone.	m2	179	27	4833
					-
<b>TOTAL CARRIED TO SUMMARY .....</b>					<b>6905,00</b>
					=
<b><u>B. SUPERSTRUCTURE</u></b>					
<b><u>2. BRICK WORKS</u></b>					
2.1	20cm thick hollow concrete wall bedded on compo-mortar 1:2:9 mix both sides left for plastering.	m2	47	110	5170
2.2	Ditto, but 10cm thick brick wall	m2	27	70	1890
					-
<b>TOTAL CARRIED TO SUMMARY .....</b>					<b>7060,00</b>
					=
<b><u>3. CARPENTRY AND JOINERY</u></b>					
3.1	Eucalyptus post for roofing, as shown on the section of section the drawing.	m	34	25	850
3.2	5x3cm zigba wood perlin, on which the C.I.S. is going to be fixed.	m	59	30	1770
3.3	Supply and fix 0.3mm thick C.I.S roofing, to be fixed to the perlin price including lap; roof ridges and washers	m2	44	80	3520
					-
<b>TOTAL CARRIED TO SUMMARY .....</b>					<b>6140,00</b>
					=



Table 2.1 (2) Bill of Quantity for School and Public Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
<b>4. METAL WORKS</b>					
4,1	Metal doors and windows constructed in accordance to detail drawing, including one coat of anti-rust and three coats of oil paint:-				
	<b>Doors</b>				
	a) Type D1 size: 60 x 170	No	10	400	4000
	b) Type D2 size: 100 x 200	No	2	600	1200
					<b>5200,00</b>
<b>5. PLASTERING</b>					
5,1	Apply three coats of plaster in compo-mortar (1:2:9) mix up to fine finish to all internal walls of the latrine units.	m2	61	28	1708
5,2	Ditto but to external wall of the front faces.	m2	11	30	330
					<b>2038,00</b>
<b>6. PAINTING</b>					
6,1	Apply in three coats of oil paint to internal plastered wall surfaces of the latrine units.	m2	61	20	1220
6,2	Ditto but plastic emulsion paint to external wall surfaces.	m2	11	40	440
					<b>1660,00</b>
	<b>TOTAL CARRIED TO SUMMARY .....</b>				<b>=</b>
<b>7. SANITARY INSTALLATION</b>					
7,1	Supply and install Galvanized steel water supply pipes for cold water distribution from supply line, elevated tanker to all sanitary fixtures according to where shown on the drawings. Complete with the necessary connecting pieces such as bends, unions, nipples, tee, elbow, etc. shall include all the necessary assistance to the installation works, such as chiselling of walls, slabs, floors, etc. and closing them with concrete to normal condition where required. The installation shall be tested at a pressure of 1bar at the expense of the contractor.				
	Dia. ND 15mm (1/2")	ml	13	25	325
	Dia. ND 20mm (3/4")	ml	21	28	588

Table 2.1 (3) Bill of Quantity for School and Public Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
7,2	Supply and install, on water supply lines, gate valves, made of bronze or brass parts complete with rubber gaskets, hand weels unions and other accessories.				
	Dia. ND 15mm	pcs	18	25	450
	Dia. ND 20mm	pcs	2	30	
7,3	Supply and install soil waste and vent pipes in horizontal branches and vertical stacks made of UPVC pipes and fittings. Fittings should include bends, branches, tees, clearout reducers, etc. Unit price shall include all the necessary assistance work to the installation, such as chiselling of walls, slabs, floors, etc. and closing them with concrete. All pipes entering manhole shall be trapped.				
	Dia. ND 50mm	ml	17	55	935
	Dia. ND 100mm	ml	26	95	2470
7,4	Supply and fix on terminals of ventilation pipes, vent caps (cows), with weathering PP states, sealing gaps b/n the girth of the vent pipe and hole in the roof material.				
	Dia. ND 100mm	pcs	2	65	130
7,5	Supply and fix white vitreous Turkish type W.C. unit with trap and complete with fixing device.	pcs	10	700	7000
7,6	Construct sanitary manholes on domestic sewer lines in 200mm HCB wall plastered from the inside with cement mortar (1:3) on a base of mass concrete slab 100mm thick with proper slope for smooth flow, with reinforced concrete cover.				
	600 x 600mm	pcs	2	800	1600
7,8	Supply and install fiber-glass elevated tank of capacity 1 with vent pipe 25mm, drain pipe and gate valve of diam. 50mm and manhole 60x60cm. cover shall be provided.	pcs	1	1500	1500
					14998,00
	<b>8. SEPTIC TANK</b>				
	<b>Excavation &amp; earthworks</b>				
8,1	Clear off site to remove top soil to an average depth of 20cm.	m2	16	4	64
8,2	Bulk excavation for under ground reservoir excavated in ordinary soil to a depth not exceeding 150cm from the stripped ground level.	m3	109	20	2180
8,3	Return fill around reservoir with good, dry excavated material from site and well ram in layers every 30cm interval.	m3	78	22	1716

Table 2.1 (4) Bill of Quantity for School and Public Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
8,5	Cartaway surplus excavated material to a distance not exceeding 5km from the compound.	m3	31	25	775
8,6	25 cm thick basaltic or equivalent stone hardcore and blinded with crushed stone.	m2	36	27	972
	<b>Concrete works</b>				
	Reinforced concrete in c-25,360kg cement/m3 filled in to formworks and vibrated around rod reinforcement. steel reinforcement and formworks measured separately.				
8,7	In floor slab	m3	4	65	260
8,8	In roof slab	m3	5	100	500
	<b>Steel works</b>				
	Steel reinforcements according to drawing. Price includes cutting ,bending ,placing in position and tying wires.				
8,9	a) Dia.8mm deformed bar	Kg	71	7	511
8,10	b) Dia.12mm deformed bar	Kg	111	7	801
	<b>Formworks</b>				
	Provide cut and fix in position sawn zigba form works :				
8,11	a) Roof slab	m2	25	65	1625
	<b>Walls</b>				
8,12	50 cm thick in trachetic or equivalent stone wall bedded in cement mortar 1:3.	m3	55	290	15950
	<b>Finishing</b>				
8,13	Apply three coats of plastic in cement-mortar (1:3) mix up to	m2	110	37	4070
8,14	Provide and install steel manhole cover of 10mm thick and (60x60)cm size.	pcs	2	500	1000
8,15	Provide and install inlet and outlet pipes with all necessary fittings.	Ls	1	300	300
	<b>TOTAL CARRIED TO SUMMARY</b>				<b>30724,56</b>
					=

Table 2.2 Bill of Quantity for Household Flush Latrine

**SUMMARY**

**A. SUPERSTRUCTURE**

1 EXCAVATION AND EARTHWORK 551,60

**B. SUPERSTRUCTURE**

1 BRICKWORKS 690,20

2 CARPENTARY AND JOINERY 440,00

3 METAL WORKS 400,00

4 PLASTERING 276,08

5 PAINTING 197,20

6 SANITARY INSTALLATION 1975,00

7 SEPTIC TANK 5764,28

**TOTAL 10 294,36**

Table 2.2 (1) Bill of Quantity for Household Flush Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
<b>A. SUBSTRUCTURE</b>					
<b>1. EXCAVATION &amp; EARTHWORKS</b>					
1.1	Clear off site to remove top soil to an average depth of 20cm.	m2	9,60	4	38
1,2	Excavate for trench foundation in ordinary soil to a depth not exceeding 75cm from the stripped ground level.	m3	9,60	25	240
1,3	Return fill around foundation with good, dry excavated material from site and well ram in layers every 25cm interval.	m3	6,40	22	141
1,4	Cartaway surplus excavated material to a distance not exceeding 5km from the compound.	m3	4,00	25	100
1,5	25cm thick basaltic or equivalent stone hardcore and blinded with crushed stone.	m2	1,20	27	32
<b>TOTAL CARRIED TO SUMMARY .....</b>					<b>551,60</b>
<b>B. SUPERSTRUCTURE</b>					
<b>2. BRICK WORKS</b>					
2,1	10cm thick hollow concrete wall bedded on compo-mortar 1:2:9 mix both sides left for plastering.	m2	9,86	70	690
<b>TOTAL CARRIED TO SUMMARY .....</b>					<b>690,20</b>
<b>3. CARPENTRY AND JOINERY</b>					
3,1	Eucalyptus post for roofing, as shown on the section of the drawing.	m	8,00	25	200
3,2	5x3cm zigba wood perlin, on which the C.I.S. is going to be fixed.	m	8,00	30	240
3,3	Supply and fix 0.3mm thick C.I.S roofing, to be fixed to the perlin price including laps, roof ridges and washers.	m2	1,80	80	144
<b>TOTAL CARRIED TO SUMMARY .....</b>					<b>440,00</b>

Table 2.2 (2) Bill of Quantity for Household Flush Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
<b>4. METAL WORKS</b>					
4,1	Metal doors and windows constructed in accordance to detail drawing, including one coat of anti-rust and three coats of oil paint:-				
	<b>Doors</b>				
	a) Type D1 size: 60 x 170	No	1,00	400	400
					<b>400,00</b>
<b>5. PLASTERING</b>					
5,1	Apply three coats of plaster in compo-mortar (1:2:9) mix up to fine finish to all internal walls of the latrine units.	m2	9,86	28	276
					<b>276,08</b>
<b>6. PAINTING</b>					
6,1	Apply in three coats of oil paint to internal plastered wall surfaces of the latrine units.	m2	9,86	20	197
					<b>197,20</b>
<b>TOTAL CARRIED TO SUMMARY .....</b>					<b>400,00</b>
<b>7. SANITARY INSTALLATION</b>					
7,1	Supply and install Galvanized steel water supply pipes for cold water distribution from supply line, elevated tanker to all sanitary fixtures according to where shown on the drawings. Complete with the necessary connecting pieces such as bends, unions, nipples, tee, elbow, etc. shall include all the necessary assistance to the installation works, such as chiselling of walls, slabs, floors, etc. and closing them with concrete to normal condition where required. The installation shall be tested at a pressure of 1bar at the expense of the contractor.				
	Dia. ND 15mm (1/2")	ml	4,00	25	100
7,2	Supply and install, on water supply lines, gate valves, made of bronze or brass parts complete with rubber gaskets, hand weels unions and other accessories.				
	Dia. ND 15mm	pcs	1,00	25	25

Table 2.2 (3) Bill of Quantity for Household Flush Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
7,3	Supply and install soil waste and vent pipes in horizontal branches and vertical stacks made of UPVC pipes and fittings. Fittings should include bends, branches, tees, clearout reducers, etc. Unit price shall include all the necessary assistance work to the installation, such as chiselling of walls, slabs, floors, etc. and closing them with concrete. All pipes entering manhole shall be trapped.				
	Dia. ND 100mm	ml	3,00	95	285
7,4	Supply and fix on terminals of ventilation pipes, vent caps (cows), with weathering PP states, sealing gaps b/n the girth of the vent pipe and hole in the roof material.				
	Dia. ND 100mm	pcs	1,00	65	65
7,5	Supply and fix white vitreous Turkish type W.C. unit with trap and complete with fixing device.	pcs	1,00	700	700
7,6	Construct sanitary manholes on domestic sewer lines in 200mm HCB wall plastered from the inside with cement mortar (1:3) on a base of mass concrete slab 100mm thick with proper slope for smooth flow, with reinforced concrete cover.				
	600 x 600mm	pcs	1,00	800	800
					1975,00
<b>8. SEPTIC TANK</b>					
<b><u>Excavation &amp; earthworks</u></b>					
8,1	Clear off site to remove top soil to an average depth of 20cm.	m2	5,33	4	21
8,2	Bulk excavation for under ground reservoir excavated in ordinary soil to a depth not exceeding 150cm from the stripped ground level.	m3	36,33	20	727
8,3	Return fill around reservoir with good, dry excavated material from site and well ram in layers every 30cm interval.	m3	26,00	22	572
8,5	Cartaway surplus excavated material to a distance not exceeding 5km from the compound.	m3	10,30	25	258
8,6	25 cm thick basaltic or equivalent stone hardcore and blinded with crushed stone.	m2	12,00	27	324

Table 2.2 (4) Bill of Quantity for Household Flush Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
	<b>Concrete works</b>				
	Reinforced concrete in c-25,360kg cement/m3 filled in to formworks and vibrated around rod reinforcem. steel reinforcement and formworks measured separately.				
8,7	In floor slab	m3	1,30	65	85
8,8	In roof slab	m3	1,70	100	170
	<b>Steel works</b>				
	Steel reinforcements according to drawing. Price includes cutting ,bending ,placing in position and tying wires.				
8,9	a) Dia.8mm deformed bar	Kg	23,70	7	171
8,10	b) Dia.12mm deformed bar	Kg	37,10	7	267
	<b>Formworks</b>				
	Provide cut and fix in position sawn zigba form works :				
8,11	a) Roof slab	m2	2,70	65	176
	<b>Walls</b>				
8,12	50 cm thick in trachetic or equivalent stone wall bedded in cement mortar 1:3.	m3	6,00	290	1740
	<b>Finishing</b>				
8,13	Apply three coats of plastic in cement-mortar (1:3) mix up to	m2	12,30	37	455
8,14	Provide and install steel manhole cover of 10mm thick and (60x60)cm size.	pcs	1,00	500	500
8,15	Provide and install inlet and outlet pipes with all necessary fittings.	Ls	1,00	300	300
	<b>TOTAL CARRIED TO SUMMARY</b>				<b>5764,28</b>



Table 2.3 Bill of Quantity for Double PTT VIP Latrine

Material expenses for double pit VIP

Item No.	Description	Unit	Quantity	Total amount	
				Unit rate Nfa	Nfa
1	Hollow block (20x20x10)	pcs	210	1,5	315
2	Stone	m <sup>3</sup>	7	20	140
3	Cement	quintel	4	70	280
4	Sand	m <sup>3</sup>	3,5	40	140
5	Reinforcement bar dia. 10mm	kg	31	6	186
6	Galvanized sheet metal vent pipe w	pcs	2	25	50
7	Door made with GSM complete with wire mesh and lock	pcs	1	110	110
8	Corrugated iron sheet roof	pcs	1	100	100
9	Wooden post for roof support	pcs	1	70	70
<b>Total</b>					<b>1391</b>

Labour expenses for double pit VIP

Item No.	Description	Total amount	
		Unit rate Nfa	Nfa
1	Pit cover slab	ls	60
2	Door	ls	40
3	Masonry work	ls	100
4	Digging pit-8m <sup>3</sup>	10/m <sup>3</sup>	80
<b>Total labour expense</b>			<b>280</b>

Total labour and material cost of Double pit VIP latrine = Nfa 1671/-

**Table 2.4 Cost Estimation of Latrine**

Item No.	Description	Qty	1998 price Nfa	Total price Nfa	Inflated price Nfa	Total price Nfa
1	School Latrine – PFL					
	- Year 2000 – 2005	6	74,725.56	448,353.36	83,961.64	503,770
	- Year 2005 – 2010	1	74,725.56	74,725.56	112,359.61	112,360
	- Year 2010 – 2015	1	74,725.56	74,725.56	150,362.51	150,363
2	Public latrine – CFL					
	- Year 2000 – 2005	5	74,725.56	373,627.80	83,961.64	419,808
	- Year 2005 – 2010	1	74,725.56	74,725.56	112,359.61	112,360
	- Year 2010 – 2015	1	74,725.56	74,725.56	150,362.51	150,363
3	Household latrine					
	- CFL – Year 2005	1,993	10,500.00	20,926,500	11,728.65	23,375,199
	- CFL – Year 2010	1,001	10,500.00	10,510,500	15,695.58	15,711,276
	- CFL – Year 2015	1,365	10,500.00	14,332,500	21,004.23	28,670,774
	- PFL – Year 2005	1,361	10,438.46	14,206,744	11,797.80	16,056,806
	- PFL – Year 2010	2,707	10,438.46	28,256,911	15,788.12	42,738,441
	- PFL – Year 2015	2,727	10,438.46	28,465,680	21,128.06	57,616,219
	- VIP – Year 2005	1,045	1,671.00	1,746,195	1,877.54	1,962,029
	- VIP – Year 2010	880	1,671.00	1,470,480	2,512.57	2,211,062
	- VIP – Year 2015	484	1,671.00	808,764	3,362.38	1,627,392

**Table 2.5 Cost Estimation of Public Facility**

Item No.	Description	Qty	1998 price Nfa	Total price Nfa	Inflated price Nfa	Total price Nfa
1	Refuse truck (compactor)					
	- Year 2000-2005	2	1,027,586	2,055,172	1,134,596	4,135,410
	- Year 2005-2010	1	1,027,586	1,027,586	1,545,109	1,545,109
	- Year 2010-2015	2	1,027,586	2,055,172	2,067,705	4,135,410
2	Vacuum truck (3,000 lit.)					
	- Year 2000-2005	1	924,828	924,828	1,039,137	1,039,137
	- Year 2005-2010	2	924,828	1,849,656	1,390,599	2,781,198
	- Year 2010-2015	1	924,828	924,828	1,860,936	1,860,936
3	Refuse collecting bins					
	- Year 2000-2005	150	500	75,000	562	84,300
	- Year 2005-2010	100	500	50,000	752	56,200
	- Year 2010-2015	100	500	50,000	1006	56,200
4	Refuse collecting container (8m <sup>3</sup> )					
	- Year 2000-2005	20	59,086	1,181,720	66,392	1,327,840
	- Year 2005-2010	25	59,086	1,477,150	88,848	2,221,200
	- Year 2010-2015	10	59,086	590,860	118,899	1,118,899